Fig. 8. Sectio transversa e basali parte folii: (1) cellulae laminares, (2) c. ventrales, (3) c. dorsales, (4) c. strati superioris librorum, (5) duces, (6) c. strati inferioris librorum × 215.

Fig. 9. Sectio transversa nervi e parte media folii; (1) – (6) uti apud figuram 8.

Fig. 10. Sectio transversa e superiori parte folii; (1) c. laminares grana chlorophylli multa habentia, (2) – (6) uti apud figuram 8 × 215.

Fig. 11. Cellulae laminares e media parte folii in spectatione superficiali × 215.

Fig. 12. C. laminares e basali parte folii in superficiali spectatione × 215.

Fig. 13–14. Flores feminei × 16.

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## NEW OR RARE CALIFORNIAN LICHENS.

ALBERT W. C. T. HERRE.

To the student of lichens in one of the Atlantic seaboard states, it would seem that the lichen flora of California must be well known and thoroughly worked out. Yet such is not the case. Excepting the region within 75 miles of Los Angeles, and the Santa Cruz peninusla, no section of the state has been thoroughly worked. Such is the diversity of topographical and climatic conditions, that twenty miles from the Santa Cruz peninsula, in the dry Inner Coast Range, we come upon a lichen flora which presents many striking divergencies from that previously studied by me in the peninsula. Not only are there many problems of distribution to be worked out in the counties lying between the ocean and the Sacramento Valley, and in the region about Mount Shasta and the other peaks of northeastern California, but there are still many remarkable new species to be discovered. The large foliose and fruticose lichens of the state are fairly well known, and no new species of these are to be expected, though a number occur which are known only from other parts of the country. Among the rock lichens of obscure habit but little work has been done, and a careful study of the rock lichens of any cañon in the Inner Coast Range of the northern part of the state will be rewarded by many rare finds. Especially should the calcareous rocks be studied, as but very little attention has been paid to their lichens.

The following lichens are a few to which I wish to call the attention of students of our western species. I have collected most of them in various parts of the state, while a number have been recognized while studying the undetermined miscellaneous lichen collections in the herbarium of the University of California.

I reluctantly describe any species, however well marked, as new, and those herein given are but a small part of the number set aside in my herbarium as different from any described in the accessible literature or exemplified in the published exsiccata.

EVERSON, WASHINGTON.

POLYBLASTIA INTERCEDENS (Nyl.) Lonnr. Flora **41**: 630. 1858.

*Verrucaria intercedens* Nyl. Expos. Synop. Pyrenocarp. 33. 1858.

Thallus indeterminate, thin, uniform, microscopically fissured, greenish-yellow or olivaceous; no chemical reactions. Apothecia small to minute, .4 to .9 mm. in diameter, conical, almost completely immersed, the epithecium appearing as a minute dark speck at the apex; perithecium entire, yellowish brown; amphithecium pale; paraphyses none or scanty when present, simple, thread-like, and twining; asci elongate-cylindrical, 14 to 16.4$\mu$ broad and 68.4 to 82$\mu$ long; asci and spores yellow-brown with I; spores colorless, muriform, oblong, 9 to 12$\mu$ broad and 18 to 30$\mu$ long; longitudinal rows of cells 2 to 4, the transverse series 6 to 10.

Known to occur only on sandstone at Alum Rock Park, in the Mt. Hamilton range. Altitude about 150 meters.

**Trimmatothele umbellulariae** Herre, sp. nov.

Thallus very thin, forming a grayish dusky effuse patch very obscure and not affected by reagents. Apothecia exceedingly minute, .1 to .3 mm. in diameter, black, conical or hemispherical, the apical pore visible only with a strong lens; perithecium dimidiate, black; paraphyses wanting, asci not plainly evident; spores exceedingly numerous, simple, oval or short ellipsoid, colorless, becoming yellowish with I, 2 to 2.5$\mu$ broad and 2.5 to 3$\mu$ long.

On bark of living *Umbellularia californica*, in the hills of Berkeley; altitude about 125 meters. The specimens of this almost unnoticeable lichen are very scanty. Type in the author's herbarium.

CHAENOTHECA PHAEOCEPHALUM (Turn.) Th. Fr. Nov. Act. Soc. Aps. III. **3**: 351. 1861.

*Lichen phaeocephalus* Turn. Trans. Linn. Soc. Lond. **8**: 260. *pl. 6, f. 1*, 1807.

*Chaenotheca phaeocephala* Fink. Contr. U. S. Nat. Herb. **14**: 49. 1910.

Thallus of minute, gray, ashy, or yellowish green granules which are more or less congested, rarely larger and more or less squamulose, with an almost crenate margin. Stipes usually slender, short, .75 to 2. mm. in height, blackish brown, rarely branched and bearing 2 or 3 apothecia, sometimes clustered or a number arising from a common point; apothecia small, .2 to .8 mm. in diameter, top-shaped, the summit flat or slightly convex and more or less yellow or greenish-yellow pruinose, rarely brown; hypothecium dark brown; thecium pale below, very pale brown above; paraphyses simple or sometimes branched, slender, sinuous; asci imperfectly made out, very slender, cylindrical, soon deliquescing; spores simple, spherical, brown, at first nearly colorless, 2.75 to 5$\mu$ in diameter.

Rare; on an old redwood post in the Oakland Hills; at an altitude of about 175 meters. In the University of California herbarium, from Sonoma county, collection of F. T. Bioletti. Recorded by Tuckerman from New Bedford, Massachusetts, and from Canada; from Minnesota by Bruce Fink, and from the Rocky Mountains and from Vancouver Island by J. M. Macoun.

CALICIUM HYPERELLUM Ach. Meth. Lich. 93. 1803. Tuck. Genera Lich. 241. 1872. Macoun, Cat. Can. Plants, Part VII. 172. 1902.

Thallus effuse, lemon or greenish yellow, granulose to scurfy, thin and scattering or continuous; in our specimens spreading extensively, but usually forming small, interrupted patches. Apothecia numerous, stipes firm, black, stout, rather short, .5 to 1.3 mm. in height, the head lens-shaped or more or less globose, black, or sometimes slightly reddish or brownish black, .3 to .5 mm. in diameter; hypothecium dusky; paraphyses short, simple, slender; asci 24 to 27$\mu$ long, 4 to 6$\mu$ wide, cylindrical or slightly bellied; spores small and colorless or nearly so within the asci, when mature blackish, 2-celled, strongly constricted in the middle, ellipsoid or ellipsoid-pointed, 4.5 to 5.5$\mu$ broad and 9.5 to 13.6$\mu$ long.

Here described from specimens in the University of California herbarium, marked "State Survey." They were probably collected in the Yosemite in 1867, on the bark of *Abies*. This plant is common and widely distributed in Europe, but is rare and almost confined to the Pacific slope in America, though recorded from Newfoundland by Macoun. As it is recorded by Tuckerman from the Yosemite and the Big Trees, and by Dr. Hasse in a manuscript list of the lichens of southern California, as well as by Macoun from Vancouver Island. It beyond doubt occurs in the higher mountains of the Pacific slope, from the Mexican boundary to British Columbia.

ARNHONIA POLYGRAMMA Nyl. Prodr. Fl. N. Gran. 66. 1863.

Thallus small, 1 to 3 cm. in diameter, determinate, uniform, smooth, rather thin but inclined to be thick in places, creamy gray to whitish, becoming brown or yellow with KOH. Apothecia numerous, very irregular in shape, branching or stellate, innate or closely appressed; disk flat, linear, becoming protuberant when moistened, clear red-brown to brown and often slightly gray pruinose; epithecium broad, granulose, dark brown; asci short, broadly clavate, 10 to 15$\mu$ by 30 to 38$\mu$; thecium colorless or very pale yellowish, turning blue with I; spores colorless, 4-celled, ovoid or pointed ellipsoid, one end smaller than the other, 4.4 to 5.8$\mu$ broad and 13 to 14.6$\mu$ long.

On oaks in Alum Rock park, Inner Coast Range; altitude 150 meters. Described by Nylander from the United States of Colombia. Differs from *A. radiata*, with which it may be confused, in the color of the apothecia and the chemical reactions, as well as by the different appearance of the thallus.

OPEGRAPHA ABNORMIS Ach. Syn. Lich. 74. 1814.

Thallus forming a thin white or whitish, circular to irregular, small or medium sized film on the bark of living trees, no chemical reactions. Apothecia small and variously shaped, circular, irregularly angulose, and obsoletely stellate; thecium blue with I, the spores yellow; asci broadly top shaped to almost spherical, 21.8 to 24.6$\mu$ broad and 27 to 32.8$\mu$ long; spores muriform, oblong to pointed ellipsoid, 4, 6, and more commonly 8 in the asci, colorless, with a narrow halo, transverse rows of cells 7 to 9 in number, the longitudinal of 2 to 4 rows, 7.5 to 10$\mu$ broad and 14.5 to 20$\mu$ long; according to Dr. Hasse the spores are 10 to 12$\mu$ broad and 20 to 26$\mu$ long.

A tropical lichen described from New Caledonia, Jamaica, and Calcutta. Found on the trunk of a street shade tree (*Acer* sp.), near the Mission in Santa Barbara; altitude 100 meters.

OPEGRAPHA ATRA Pers. in Ust. Ann. Bot. **7**: 30. *pl. 1, f. 2.* 1794.

Thallus very thin, forming smooth brownish or yellowish or dusky gray patches, darkened by KOH. Apothecia small, linear, simple, straight, or flexuose, depressed and closely adnate, margin thick; disk a narrow crevice; hypothecium broad, brown to blackish brown; paraphyses short, simple; asci short, more or less top-shaped, with I bluish then vinous red, outer portion greenish; spores colorless, 4-celled, their tips more or less pointed, 4 to 5.5$\mu$ broad and 13.75 to 16.4$\mu$ long.

On the bark of *Umbellularia californica* in the Berkeley Hills; altitude 100 to 200 meters; not abundant.

TONINIA RUGINOSA (Tuck.) Herre. Proc. Wash. Acad. Sci. **12**: 103. 1910.

*Lecidea ruginosa* Tuck. Lich. Calif. 25. 1866. Syn. N. A. Lich. **2**: 64. 1888.

To the description given by Tuckerman, the only one to previously examine this rare lichen, I add the following data: Epithecium thick, very dark violaceous or reddish, almost black, no reaction with KOH; paraphyses simple, free, lax, slender, with enlarged bulbous pale violaceous tips; asci slender, narrowly clavate, 5 to 7$\mu$ broad and 30 to 40$\mu$ long; hypothecium yellowish to brownish, or in very thin sections quite colorless; thecium blue with I; spores 2 to 8-celled acicular, 2–3$\mu$ broad and 16–23.5$\mu$ long.

I have collected this very sparingly on the shaded under side of serpentine ledges in the Oakland Hills, at an altitude of 300 meters. The thallus agrees with Tuckerman's description; but the apothecia average much smaller, while the spores are a great deal shorter, Tuckerman giving their length as from 25-40$\mu$. Not known elsewhere.

**Heppia alumenensis** Herre, sp. nov.

Thallus of medium sized to very small umbilicate, irregular, centrally thickened squamules, which are frequently grouped so as to resemble some small *Collema*, their surface irregular, more or less granulose to verrucose, lobes small, irregular, dingy black or greenish black, under surface a flesh tint, more or less obscured by blackish granules, therefore appearing more or less dusky; alga *Scytonema*, the gonidia globose to oval, 9 to 13$\mu$ in diameter; no chemical reactions. Apothecia one to several in a squamule, small, at first subglobose, the disk very narrow and dotlike, later becoming rather broad, disk flat, reddish-brown to concolorous, margin thick, entire; hypothecium clear; paraphyses simple, septate, 2.2 to 4.5$\mu$ broad with enlarged, pale yellow tips; fertile asci infrequent, oblong-clavate and ventricose-oblong, 26 to 28$\mu$ broad and 68 to 79$\mu$ long; thecium blue, then sordid reddish-yellowish with I; spores 16, 20, 24, 32, and very numerous in the asci, colorless, simple, ellipsoid, thin-walled, 2 to 4$\mu$ broad and 5.5 to 9$\mu$ long, also 3 to 4$\mu$ broad and 11 to 12$\mu$ long.

On stones at Alum Rock park near San José, and probably occurring in

similar situations throughout the Inner Coast Range. Type in the author's herbarium.

LECANIA ERYSIBE (Ach.)

*Lichen erysibe* Ach. Lich. Suec. Prodr. 50. 1798.

Thallus crustose, effuse, thin and of crumb-like granules, or of thick, fragile, deeply fissured areoles, with minutely and imbricately lobulate surface, the lobules with crenate margin, sandy-brown and olivaceous; no chemical reactions. Apothecia minute or very small, .3 to 1 mm. in diameter, closely adnate, the flat disk dark red-brown or blackening, margin rather thick, entire, pale, sometimes disappearing; hypothecium colorless; thecium pale below, becoming brownish or reddish above, blue with I, finally turning to greenish; paraphyses thick, more or less jointed or septate, their tips slightly enlarged, colorless or darkened; asci short, clavate; spores ellipsoid, simple or imperfectly 2-celled, 4 to 5.5$\mu$ broad, and 10.9 to 14$\mu$ long.

Rare; on sandstone in the Oakland Hills, altitude about 400 meters.

**Legania shastensis** Herre, sp. nov.

Thallus thin, effuse, of thin or thickly scattered, small, crumb-like granules, ashen gray to dusky; KOH yellowish; $CaCl^2O^2$. Apothecia numerous, very small to minute, .3 to .8 mm. in diameter, circular, adnate, the flat to slightly convex disk pale yellow to reddish, much like that of *Caloplaca gilva*, thalline margin paler, entire, thin, often disappearing; very small apotheica often have a thicker whitish margin, with darker, pruinose disk; hypothecium broad, colorless; thecium deep blue with I; paraphyses simple, not septate. thread-like, subcoherent, their apices not thickened; asci club-shaped to sub-cylindrical, small, 8–11$\mu$ broad by 36–44$\mu$ long; spores 6 (?) and 8, small, usually bowed but also straight, 4-celled, 3.5 to 5.5$\mu$ broad and 11 to 14$\mu$ long.

The few specimens known were collected on the bark of *Aesculus* at Stillwater, Shasta county. This deceptive lichen resembles *Caloplaca gilva* externally and is very puzzling in section. The thallus is blackened by a *Scytonema*, and the alga of the lichen is apparently a *Nostoc*, large colonies of which are parasitic within the thallus, while of course *Scytonema* filaments are scattered everywhere. It therefore requires very careful study to demonstrate that the real alga of the lichen is not one of the *Cyanophyceae*.

Type in author's herbarium; cotypes in the herbarium of the University of California and of Dr. H. E. Hasse.

PARMELIA OLIVARIA (Ach.) Hue, Lich. Ex. Eur. 195. 1803.

*Parmelia perlata* B. *olivaria* Ach. Meth. Lich. 217. 1803.

Thallus more or less orbiculate and dilated, small to medium size, rather loosely attached, the surface smooth, gray-green, lobes rather short, crisp, with flexuous, crenate margin, their thickened tips strongly upward curved, and inward and white sorediate, under surface black with little or no brown margin, minutely wrinkled, naked or with scattered patches of stout black fibrils; KOH yellow, the medulla not affected; surface not affected by $CaCl_2O_2$ but the medulla tinged red; ours sterile.

On trees, Mission Ridge, Santa Barbara; altitude about 240 meters. Reported by Dr. Hasse from near Santa Monica. Originally described by Acharius from olive trunks in Spain, and widely distributed, though not often recognized by American writers. Probably native to all the southern half of California.

ALECTORIA OREGANA Nyl. Lich. Jap. Obs. II. 104. 1890.

Thallus erect and shrub-like or sub-pendulous, 3. to 5. cm. in height, cespitose and usually forming densely matted clumps so that the length of the plant is not easily determined, slender, weak, irregular, more or less angulose and much contorted, with smooth, shiny epidermis, branches frequent, their tips filiform and pointed, various shades of greenish or reddish brown, basally much paler, the upper portion often much darker, becoming blackish brown; no chemical reactions. Apothecia 2 to 7 mm. in diameter, lateral, sessile, at first circular and concave, but later becoming strongly convex or domelike, disk shining chestnut brown; receptacle roughened, tuberculate, and usually ciliate, the fibrils pointed, not numerous; thecium and hypothecium colorless; epithecium broad, dark brown; asci short, clavate, 23 to 25$\mu$ long and 7 to 8.2$\mu$ broad; thecium blue with I, and according to Nylander changing to fulvescent, but not so in my material; spores simple, colorless, short ellipsoid to almost globose, 3 to 4.5$\mu$ broad and 5 to 6$\mu$ long.

Rather common on *Pinus ponderosa*, mingled with *Nephromopsis platyphylla* and *Parmelia enteromorpha*, on Mount Hamilton, Inner Coast Range; altitude about 1200 meters and above. I have also examined material from San Jacinto Mountain, where it occurs at an altitude of 1540 meters on *Pinus ponderosa*, and from Shasta county near Forestdale, on *Pseudotsuga taxifolia*. It has been collected by Dr. Hasse in the San Gabriel Range near Los Angeles, and in the Tehachepi Range.

A species found on the bark of living conifers and originally named by Tuckerman from material collected in Oregon, though the only published description is by Nylander. Especially distinguished by its apothecia which are ciliate like those of *Usnea*.

CALOPLACA CIRROCHROA (Ach.) Th. Fr. Lich. Scand. **1**: 171. 1871.

*Lecanora cirrochroa* Ach. Syn. Lich. 181. 1814.

*Placodium cirrochroum* Tuck. Syn. N. A. Lich. **1**: 171. 1882.

Thallus orbicular, closely appressed to the substratum, similar to *C. murorum* but smaller and usually thinner; centrally orange yellow and darker, in our specimens a yellowish brown, with lemon-colored soredia, often warty crustose or disappearing, except the radiate, narrowly and intricately laciniate effigurate margin, tips of the narrow radiate lobes usually white pruinose, turning purplish with KOH. Apothecia very rare and minute, scattered, plane, orange yellow with sub-entire margin; spores 5 to 6$\mu$ wide and 13 to 18$\mu$ long, our scanty specimens sterile.

Rare; on rocks at Alum Rock Park, in the Mt. Hamilton range, at an altitude of about 150 meters. A European lichen of calcareous rocks, collected

in Vermont by Dr. Farlow, but not otherwise known to me from this country. My material, while off-color and not typical, agrees exactly with some specimens collected by me at Mandling, Styria. So far as I know, fertile material has not been collected in America.

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(To Society Members Only—For Postage.)

Mr. Frank Dobbin, Box 197, Shushan, N. Y. *Peltigera venosa* (L.) Hoffm. From Vt.

Rev. Frederick S. Beattie, Lincoln, N. H.—*Ramalina farinacea* Ach. From the Phillipine Islands. Coll. Geo. E. Burnham.

Miss Mary F. Miller, Box 203, R. F. D. 4, Station A, Washington, D. C.—*Cladonia furcata* (Huds.) Schrad. and *C. pyxidata* (L.) Hoffm. From Fairfax Co., Va.

H. Dupret, Seminary of Philosophy, Montreal, Canada.—*Drepanocladus aduncus* var. *intermedius*, *D. aduncus* var. *polycarpon* and *D. aduncus forma subpiligera* Ren., *D. capillifolius* Warnst. (typicus), *D. capillifolius* var. *brachydictyon* Ren., *D. capillifolius* forma *fallax* Ren. From Canada.

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